

# CLOXACILLIN MASTITIS OINTMENT<sup>1</sup> IN THE TREATMENT OF BOVINE MASTITIS

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THE VETERINARY LITERATURE has increasingly emphasized the importance of the staphylococci as a cause of bovine mastitis (6, 8, 16). In many areas this group of microorganisms is recognized as being responsible for the majority of the cases of infectious mastitis in dairy cattle (1, 5, 12).

The increasing incidence of staphylococci relative to streptococci as infectious agents in bovine mastitis is attributed, in part, to the ease with which the staphylococci evolve antibiotic-resistant strains. The synthesis from the penicillin nucleus, 6-aminopenicillanic acid, of antibiotics that are penicillinase-resistant (10) is, therefore, of interest and significance in the treatment of staphylococcal mastitis.

The failure to completely eliminate infection with conventional intramammary preparations is a contributing factor to the increasing significance of the staphylococci as udder pathogens. Several studies (2, 11, 14) have demonstrated that antibiotics in slow-release bases are more effective than the same antibiotics in quick-release bases for the treatment of streptococcal and, in particular, staphylococcal mastitis.

Cloxacillin, 3-ortho-chlorophenyl-5-methyl-4-isoxazolyl penicillin, is penicillinase-resistant. Its chemical, toxicological, pharmacological and microbiological properties are described in detail elsewhere (7, 10, 15).

The purpose of this study was to evaluate the sodium salt of cloxacillin in a slow-release base as a treatment for streptococcal and penicillin-resistant and penicillin-sensitive staphylococcal mastitis.

## MATERIALS AND METHODS

A number of herds were selected for purposes of this study with the cooperation of the

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Veterinary Services Laboratories in Guelph and Kemptville and the Laboratoire de Médecine vétérinaire in Montréal. These herds had a history of chronic or resistant mastitis.

The reports of the laboratory examination results carried out by these laboratories on individual quarter milk samples were used to determine the presence of mastitis in the herds and to enable the investigators to identify the quarters with staphylococcal and streptococcal infections.

The investigational procedure was as follows: Quarter milk samples were drawn just before treatment was initiated. Further quarter milk samples were taken at, approximately, one, two and three weekly intervals after the treatment schedule was completed. In dry cows, quarter milk samples were taken one week after calving. All milk samples were submitted to the laboratories for Gel tests and bacteriological examinations.

Single dose tubes, each containing 200 mg of sodium cloxacillin in a 3% aluminum monostearate base were used throughout the study.

The treatment schedules were as follows: In lactating cows, the contents of one tube were inserted into the affected quarter. This procedure was repeated at 48 hour intervals until a total of three tubes had been administered. Milk taken from treated cows within 72 hours after the latest treatment was not to be used for food. In dry cows, the contents of one tube were inserted into the affected quarter following the last milking of the lactation period.

## RESULTS

The response to treatment in lactating cows is presented in Table I. Two weeks after the last treatment, 87 (83%) of the 105 treated quarters were bacteriologically negative.

Table II presents the results of dry cow treatment. One week after calving, 54 of the 66 treated quarters were found to be bacteriologically negative with a percentage cure rate of 82%.

A statistical analysis of California Mastitis Test results prior to and five to 10 days post-treatment in lactating cows indicated an absence of irritation (3).

Table III summarizes the results of 1,138

## CLOXACILLIN

TABLE I  
LACTATING COWS—RESPONSE TO TREATMENT WITH CLOXACILLIN

Pretreatment		Posttreatment					
Organism isolated	No. of Quarters Treated	Quarters bacteriologically negative at					
		1 week		2 weeks		3 weeks	
		Number	% total	Number	% total	Number	% total
Hemolytic staphylococci	65	58	89	56	86	36*	78*
Streptococci (agalactiae & non agalactiae)	18	16	89	16	89	16	89
Mixed staph. & strep.	22	18	82	15	68	14	63

\*Only 46 of the original 65 treated quarters were sampled at 3 weeks.

TABLE II  
DRY COWS—RESPONSE TO TREATMENT WITH CLOXACILLIN

Pretreatment		Posttreatment	
Organism isolated	No. of Quarters Treated	Quarters bacteriologically negative	
		1 week after calving	
		Number	% total
Hemolytic staphylococci	35	29	83
Non-hemolytic staphylococci	6	5	83
Streptococci (agalactiae & non agalactiae)	21	16	76
Mixed staph. & strep.	4	4	100

TABLE III  
RESULTS OF 1,138 SENSITIVITY TESTS ON ALPHA AND BETA HEMOLYTIC STAPHYLOCOCCI ISOLATED FROM MILK SAMPLES

No. of tests performed	Sensitive to penicillin & cloxacillin	Resistant to penicillin & cloxacillin	Sensitive to penicillin & resistant to cloxacillin	Resistant to penicillin & sensitive to cloxacillin
1,138	850	40	8	240

sensitivity tests carried out in conjunction with this study on alpha and beta hemolytic staphylococci from milk samples. Over 24% of the strains tested were resistant to penicillin and 4% were resistant to cloxacillin.

#### DISCUSSION AND CONCLUSIONS

Opinions differ as to the criteria for assessing the efficacy of a mastitis treatment. It has been stated that a bacteriological cure may be claimed if no organisms are isolated from the treated quarter for at least two weeks post-treatment (9, 11). Some authorities expect that the treated quarter should remain unin-

fected for at least three weeks posttreatment (13, 14). Infections occurring after these intervals are assumed to be the result of a reinfection of the quarter.

The bacteriological cure rates at two and three week intervals after treatment in this study, were satisfactory.

In the treatment of mastitis, the consensus appears to be that the antibiotic should be maintained at a therapeutic level in the quarter for about five to six days (4, 14). Three infusions at 48-hour intervals of the slow-release base formulation used in this trial achieved this effect.

Apart from the treatment of mastitis in lac-

tating cows, more attention is being paid to the control of this disease in the dry cow. The results of the treatment of dry cows in this study were quite favourable.

#### SUMMARY

The results are presented of a study to determine the efficacy of the sodium salt of cloxacillin in a slow-release base as a treatment for streptococcal and staphylococcal bovine mastitis.

In lactating cows, the contents of one tube of cloxacillin were inserted into the affected quarter and this procedure was repeated at 48-hour intervals until a total of three tubes had been given. Two weeks posttreatment, 83% of the 105 quarters treated were found to be bacteriologically negative.

In dry cows, after a single treatment following the last milking of the lactation period, 82% of the 66 quarters treated were bacteriologically negative one week after calving.

#### RÉSUMÉ

Au cours de cette étude, on a cherché à déterminer l'efficacité d'un sel sodique de cloxacilline, administré dans une base à diffusion lente, dans le traitement de la mammite bovine streptococcique et staphylococcique.

Chez les vaches en lactation, on injecta le contenu d'un tube de cloxacilline dans les quartiers infectés. On répéta l'opération à intervalles de 48 heures, à trois reprises. Deux semaines après le traitement, 83% des 105 quartiers traités étaient négatifs à l'examen bactériologique.

Les vaches sèches qui avaient été traitées une seule fois après leur dernière traite ne présentaient pas d'infection bactériologique une semaine après le vêlage dans une proportion de 82% de 66 quartiers.

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